Medical Journal of Europe

ISSN: 2995-7907 doi: 10.5281/zenodo.10730204

Toxoplasma gondii Seropositivity in Patients Suspected of Toxoplasmosis

Hacer Isler [1] , Eşe Basbulut [1] , Melek Bilgin [1], Metin Özdemir [2]

[1] Saglik Bilimleri University, Samsun Training and Research Hospital, Microbiology Laboratory, Samsun, Türkiye
[2] Department of Medical Microbiology, Samsun Gazi State Hospital, Samsun, Türkiye

Article Info

Received: 25 December 2023

Revised: 01 March 2024

Accepted: 01 March 2024

Published: 01 March 2024

Keywords:

Toxoplasma gondii, seroprevalence, ELISA, Toxoplasma IgG, Toxoplasma IgM.

Corresponding author:

Hacer Isler.

Saglik Bilimleri University, Samsun Training and Research Hospital, Microbiology Laboratory, Samsun, Türkiye

hacer.isler@saglik.gov.tr

ABSTRACT

Toxoplasmosis is an obligate intracellular parasitic disease caused by *Toxoplasma gondii*, which can be acquired or congenital. While *Toxoplasma gondii* has little or no symptoms in seropositive people, it causes serious symptoms in immunocompromised patients and in mother-to-baby transmission. The aim of the study was to retrospectively investigate *T. gondii* seropositivity in patients who applied to various clinics and outpatient clinics with suspicion of toxoplasmosis and to evaluate the results. In the study, *Toxoplasma* IgG and/or IgM antibodies of a total of 944 patients, aged between 0-80, who applied to SBU Samsun Training and Research Hospital Microbiology Laboratory between January 2018 and January 2019 with a preliminary diagnosis of toxoplasmosis, were tested by chemiluminescent microparticle immunological test (CMIA). Abbott-Architect system, Weisbaden, Germany) results were evaluated retrospectively. A total of 389 (21.8%) of the patients were male. The median age was 45 for men and 35 for women. Both antibodies were found positive in 5 (0.6%) of 807 patients in whom IgG and IgM were examined together. Antibody positivity was positive in 187 (20.3%) of 923 patients in whom IgG was studied, borderline in 2 (0.2%), and antibody positivity was positive in 19 (2.0%) of 944 patients (0.0%) in whom IgM was studied . ,3) borderline result was detected. The findings obtained from this study show that *T. gondii* seropositivity is at a significant frequency in the society and antibody screening is necessary, especially in risk groups, pregnant women and those planning a pregnancy in the near future.

Cite as: Isler H, Basbulut E, Bilgin M, Özdemir M. Toxoplasma gondii Seropositivity in Patients Suspected of Toxoplasmosis. Med J Eur. 2024;2(2):82-84. doi: 10.5281/zenodo.10730204

INTRODUCTION

Toxoplasmosis is a disease caused by *Toxoplasma gondii*, an obligate intracellular parasite. Infection is transmitted to people in many ways. Chorioretinitis, hydrocephalus, microcephaly, cerebral calcification and mental retardation may occur in infected babies. Most cases of acquired toxoplasmosis are asymptomatic. Accidental ingestion of oocysts shed by cat feces and eating raw or undercooked meat containing bradyzoite forms are considered the most important ways of transmission (1-3).

Transmission from mother to baby can cause serious damage, especially if it occurs in the early stages of pregnancy. In addition, blood and tissues taken from people with Toxoplasmosis can also cause transmission. It is known that toxoplasmosis is asymptomatic in 90% of people with healthy immune systems. In people with suppressed immune systems, life-threatening infections may occur as a result of the reactivation of tissue cysts that remain silent in the host for a long time (1-3). Chorioretinitis, cerebral calcification, hydrocephalus, microcephaly and mental retardation may occur in infected babies. Most cases of acquired toxoplasmosis are asymptomatic. In symptomatic cases, symptoms similar to a mild cold, a picture similar to infectious mononucleosis may be observed, and fetality may also be observed. In patients with suppressed immune systems, such as AIDS, *Toxoplasma* most frequently presents with encephalitis (4,5).

Many tests are used in the diagnosis of the disease. Although the Sabin-Feldman dye test is not widely used, it is considered the gold standard. ELISA, Indirect Fluorescent Antibody Test (IFAT) and Western blot are used in diagnosis. ELISA is frequently used in diagnosis because it is a reliable, economical and easy method (4,5). ELISA is frequently used in diagnosis because it is a reliable, economical and easy method. The main factors affecting the seroprevalence of the parasite have been reported as: socio-economic level, food habits, hygiene and sanitation, host sensitivity, geographical location and soil moisture (1,4,5).

The aim of the study was to retrospectively investigate *T. gondii* seropositivity in patients who applied to various clinics and outpatient clinics with suspicion of toxoplasmosis and to evaluate the results.

METHODS

In the study, a total of 1784 patients aged between 0-80 years, who applied to SBU Samsun Training and Research Hospital Microbiology Laboratory with a preliminary diagnosis of toxoplasmosis between January 2018 and January 2019, were examined using the chemiluminescent microparticle immunological test (CMIA) method (Abbott-Architect system, Weisbaden, Germany). *Toxoplasma* IgG and/or IgM results were evaluated retrospectively.

Tests were made in our hospital laboratory with the chemiluminescent microparticle immunoassay (CMIA) method (Abbott-Architect system, Weisbaden, Germany) kit. Serum samples were taken 5 milliliters each into anticoagulant-free gel tubes. After waiting for the samples to clot for approximately 20 minutes, the samples were centrifuged at 4000 rpm for 10 minutes and their serum was separated. The samples were measured without waiting. For *T. gondii* IgM; The cut-off index is 1. 0 IU/mL and above is positive, =0, which is considered as an intermediate value by the manufacturer. 8 to <1. Values between 0 were considered borderline and values below 0.8 IU/mL were considered negative.

RESULTS

A total of 389 (21.8%) of the patients were male. The median age was 45 for men and 35 for women. It was observed that female patients mostly came due to pregnancy, male patients between the ages of 20-40 came from the hematology department for the etiology of anemia, and patients over the age of 60 came from the otolaryngology department for the etiology of facial paralysis.

Both antibodies were found positive in 5 (0.6%) of 807 patients in whom IgG and IgM were examined together. Antibody positivity was positive in 187 (20.3%) of 923 patients in whom IgG was studied, borderline in 2 (0.2%), and antibody positivity was positive in 19 (2.0%) of 944 patients (0.0%) in whom IgM was studied. ,3) borderline results were detected (Table 1).

Table 1. Distribution of toxoplasmosis antibody test results.

	n	**%**
IgG (+)	187	20.3
IgG Borderline	2	0.2
IgM (+)	19	2.0
IgM Borderline	3	0.3
IgM (+) IgG (+)	5	0.6

DISCUSSION

The seroprevalence of toxoplasmosis in the world varies in a wide range, such as 12-90%, depending on factors such as age, education, cleanliness, crowding, life, tradition and eating habits. It is important to make a correct diagnosis of toxoplasmosis, which causes significant complications in immunocompromised individuals and the fetus . It is estimated that 16-40% of the population in the UK and the USA and 50-80% in Europe is infected with *Toxoplasma* (1,6,7).

In studies conducted on toxoplasmosis seropositivity in Turkey, anti-*Toxoplasma* IgM rates are 0-13.4%; IgG rates have been reported as 17.5% to 69.5% (8-16). Looking at this seropositivity rate in childhood, it can be concluded that seropositivity in society increases with age, although the number of samples is limited. In our study, *T. gondii* IgG antibody prevalence increased linearly with age. Similarly, a linear increase in prevalence with age has also been reported in studies conducted in other countries (17-19).

Studying the seroprevalence of toxoplasmosis in childhood in a larger sample will both provide information about risk factors in childhood and reveal the prevalence more clearly. Approximately one-third of humanity worldwide, from Alaska to Australia, has been exposed to this parasite. It does not cause serious disease in most adults, but can cause blindness and mental retardation in congenitally infected children and devastating disease in immunocompromised individuals (15-20). In studies conducted in the eastern regions of our country, IgG and IgM anti-*Toxoplasma* antibodies, respectively, were detected by Yiğit et al. (9) 24% and 0.4% in Erzurum; Gul et al. (10) 32.9% and 8.16% in Diyarbakır; Asci et al. (11) reported it as 41% and 1.8% in Elazığ. Güngör et al. (12) in their study on children in Ankara, they found anti-*Toxoplasma* IgG antibody positivity at a rate of 13.3%. While the 20.3% rate of anti-*Toxoplasma* IgG antibodies obtained in our study is consistent with studies conducted throughout Turkey, it was found to be lower than the other study conducted in Elazığ. In this study, anti-*Toxoplasma* IgG antibodies were found to be high in women, consistent with other studies. This situation can be explained by the fact that more tests are requested from pregnant women.

Detecting anti-*Toxoplasma* antibodies in newborns becomes important because Toxoplasmosis is transmitted from mother to baby and seropositivity increases with age. In Turkey, *T. gondii* screening is not routinely performed during or before pregnancy. The cases are discovered when an examination for the causative agent is requested by the gynecologist during pregnancy (8-12). When past laboratory findings are unknown, it is very difficult to comment on the date of exposure to the agent and make a treatment decision. The severity of congenital infection is closely related to the trimester of pregnancy in which the mother was infected. Although the risk of transmitting an infection acquired in the third trimester to the baby is high (60-65%), most of these children do not have any symptoms of the disease. Although transmission to the babies of women who acquire the infection in the first trimester of pregnancy is less (15-25%), serious consequences, including miscarriage, are observed (20-24). In the second trimester, the transition rate is 30-45%. The risk of congenital toxoplasmosis due to maternal infection during pregnancy varies between approximately 20% and 50%, and while toxoplasmosis findings at birth are seen in 21-28% of newborns infected in the 2nd trimester, it is detected in less than 11% of those infected in the 3rd trimester. Serious disease is observed in 10% of those born with toxoplasmosis. The most severe form of congenital toxoplasmosis is hydrocephalus, cerebral calcifications and chorioretinitis, accompanied by mental retardation, epilepsy

and visual disturbances. Although babies of mothers diagnosed with acute infection during pregnancy are tried to be diagnosed with various methods (such as PCR in amniotic fluid), sometimes these cases can be missed. This situation reveals the importance of postnatal follow-up of at-risk babies (23-26).

There were some limitations in our study. Since the study was planned only as a cross-sectional study, the patients were not evaluated long-term and the change in seropositivity was not examined. In addition, since only patients admitted to the hospital and suspected of toxoplasmosis were evaluated, the findings do not fully reflect the general seroprevalence rate of the society.

The findings obtained from this study show that *T. gondii* seropositivity is at a significant frequency in the society and antibody screening is necessary, especially in risk groups, pregnant women and those planning a pregnancy in the near future.

REFERENCES

1. Halonen SK, Weiss LM. Toxoplasmosis. Handb Clin Neurol. 2013;114:125-145. doi:10.1016/B978-0-444-53490-3.00008-X
2. Montoya JG, Liesenfeld O. Toxoplasmosis. Lancet. 2004;363(9425):1965-1976. doi:10.1016/S0140-6736(04)16412-X
3. Saadatnia G, Golkar M. A review on human toxoplasmosis. Scand J Infect Dis. 2012;44(11):805-814. doi:10.3109/00365548.2012.693197
4. Zhang K, Lin G, Han Y, Li J. Serological diagnosis of toxoplasmosis and standardization. Clin Chim Acta. 2016;461:83-89. doi:10.1016/j.cca.2016.07.018
5. Robert-Gangneux F, Dardé ML. Epidemiology of and diagnostic strategies for toxoplasmosis [published correction appears in Clin Microbiol Rev. 2012;25(3):583]. Clin Microbiol Rev. 2012;25(2):264-296. doi:10.1128/CMR.05013-11
6. Heavey E. Toxoplasmosis update. Nursing. 2018;48(7):62-64. doi:10.1097/01.NURSE.0000534106.04143.54
7. Ufuk F. Toxoplasmosis: A Significant Parasitic Zoonosis. Radiographics. 2023;43(4):e230033. doi:10.1148/rg.230033
8. Tuncer İ, Baykan M, Akyol G. Konya ve çevresinde toxoplazmoz kuşkulu kişilerin serumlarında *Toxoplasma gondii*'ye karşı oluşan antikorların araştırılması. Türkiye Parazitol Derg. 1993;17(3-4):11-15.
9. Yiğit N, Aktaş AE, Uslu H, Aydın F, Babacan M. Atatürk Üniversitesi Tıp Fakültesi Mikrobiyoloji Laboratuvarına gelen toksoplasmosis şüpheli hasta serumlarında *Toxoplasma gondii* antikorlarının araştırılması. Türkiye Parazitol Derg. 2000;24(1):22-24.7.
10. Gül K, Dağ MN, Suay A, Mete M, Mete Ö. D.Ü. Tıp Fakültesinin değişik bölümlerine başvuran ve *Toxoplasma* ön tanısı konmuş hastalarda *Toxoplasma* antikorlarının dağılımı. Türkiye Parazitol Derg, 1994;18(4):394-397.
11. Aşçı Z, Seyrek A, Kizirgil A, Doymaz MZ, Yılmaz M. *Toxoplasma* şüpheli hasta serumlarında anti-*Toxoplasma gondii* IgG ve IgM antikorlarının araştırılması. Türkiye Parazitol Derg. 1997;21(3):245-247.
12. Güngör Ç, Akarsu GA, Özsan M. Çocukluk çağında toxoplasmosis seroprevalansı. Türkiye Parazitol Derg. 2002;26(2):121-123.
13. Yaman S, Ertabaklar H, Kapdağlı A, Ertuğ S. 2002 yılında Adnan Menderes Üniversitesi Tıp Fakültesi Parazitoloji laboratuarına toxoplasmosis araştırılması amacıyla başvuran olguların retrospektif olarak değerlendirilmesi. Türkiye Parazitol Derg. 2004;28(1):1-4. .
14. Sankur F, Ayturan Ş, Malatyalı E, Çitil BE, Ertabaklar H, Ertuğ S. Muğla Sıtkı Koçman Üniversitesi Eğitim ve Araştırma Hastanesi Mikrobiyoloji Laboratuvarı'nda 2012-2013 yılları arasında çalışılan *Toxoplasma* serolojik test sonuçlarının retrospektif olarak değerlendirilmesi.Türkiye Parazitol Derg. 2015;39:179-184.
15. Kayran İE, Yılmaz U, Östan İ, Özbilgin A. Manisa yöresinde toxoplasmosis şüpheli kişilerde *Toxoplasma gondii*'ye karşı oluşmuş IgG ve IgM antikorlarının dağılımı. Türkiye Parazitol Derg. 2002;26(2):137-139.
16. Babür C, Kılıç S, Özkan AT, Esen B. Refik Saydam Hıfzısıhha Merkezi Başkanlığında 1995-2002 yılları arasında çalışılmış Sabin-Feldman Dye test sonuçlarının değerlendirilmesi. Türkiye Parazitol Derg. 2002;26(2):124-128.
17. Borkakoty B, Biswas D, Jakharia A, Mahanta J. Seroprevalence of *Toxoplasma gondii* among pregnant women in Northeast India. J Assoc Physicians India 2016;64:24-28.
18. Nogareda F, Le Strat Y, Villena I, De Valk H, Goulet V. Incidence and prevalence of *Toxoplasma gondii* infection in women in France, 1980-2020: model-based estimation. Epidemiol Infect 2014; 142(8): 1661-1670.
19. Sagel U, Krämer A, Mikolajczyk RT. Incidence of maternal *Toxoplasma* infections in pregnancy in Upper Austria, 2000-2007. BMC Infect Dis 2011; 14(11): 348.
20. Hampton MM. Congenital Toxoplasmosis: A Review. Neonatal Netw. 2015;34(5):274-278. doi:10.1891/0730-0832.34.5.274
21. Dubey JP, Murata FHA, Cerqueira-Cézar CK, Kwok OCH, Villena I. Congenital toxoplasmosis in humans: an update of worldwide rate of congenital infections. Parasitology. 2021;148(12):1406-1416. doi:10.1017/S0031182021001013
22. Kieffer F, Wallon M. Congenital toxoplasmosis. Handb Clin Neurol. 2013;112:1099-1101. doi:10.1016/B978-0-444-52910-7.00028-3
23. Kravetz J. Congenital toxoplasmosis. BMJ Clin Evid. 2010;2010:0906.
24. Ahmed M, Sood A, Gupta J. Toxoplasmosis in pregnancy. Eur J Obstet Gynecol Reprod Biol. 2020;255:44-50. doi:10.1016/j.ejogrb.2020.10.003
25. McAuley JB. Toxoplasmosis in children. Pediatr Infect Dis J. 2008;27(2):161-162. doi:10.1097/INF.0b013e3181658abb
26. Akarsu GA. Toksoplazmoz Tanısı. Ankara Üniversitesi Tıp Fakültesi Mecmuası. 2008;61(3):180-190. doi:10.1501/Tipfak_0000000670.